A

jc544 U.S. PTO
10/23/98

Practitioner's Docket No. 313-010-1 ***PATENT***

jc525 U.S. PTO
09/177356
10/23/98

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): FRANCIS J. MAGUIRE, JR.

WARNING: *37 C.F.R. § 1.41(a)(1) points out:*

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors."

For (title): TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN

CERTIFICATION UNDER 37 C.F.R. 1.10*
(Express Mail label number is mandatory.)
(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date October 23, 1998, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL092375404US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Judith Schick
(type or print name of person mailing paper)

Judith Schick
Signature of person mailing paper

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

***WARNING:** Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).*
*"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.*

1. Type of Application

This new application is for a(n)

(check one applicable item below)

☒ Original (nonprovisional)

☐ Design

☐ Plant

WARNING: *Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.*

WARNING: *Do not use this transmittal for the filing of a provisional application.*

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

☐ Divisional.

☐ Continuation.

☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(l) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: *If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.*

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

☒ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

20 Pages of specification

2 Pages of claims

8 Sheets of drawing

*WARNING: **DO NOT** submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 CFR 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).*

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. 1.84(c)).

(complete the following, if applicable)

☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. 1.84(b).

☐ formal

☒ informal

B. Other Papers Enclosed

2 Pages of declaration and power of attorney

1 Pages of abstract

____ Other

4. Additional papers enclosed

☐ Amendment to claims

☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☐ Preliminary Amendment

☐ Information Disclosure Statement (37 C.F.R. 1.98)

☐ Form PTO–1449 (PTO/SB/08A and 08B)

☐ Citations

☐ Declaration of Biological Deposit

☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative

☐ Special Comments

☐ Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

☒ Enclosed

Executed by

(check **all** *applicable boxes)*

☒ inventor(s).

☐ legal representative of inventor(s). 37 CFR 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. *See* item 13 below for fee.

☐ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 C.F.R. 1.41(c) on behalf of *all* the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently).

☐ Showing that the filing is authorized.
(not required unless called into question. 37 CFR 1.41(d))

6. Inventorship Statement

WARNING: *If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.*

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of $130.00 required by 37 CFR 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 CFR 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. 1.52(d).

8. Assignment

☐ An assignment of the invention to _____

_____

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: *A newly executed "CERTIFICATE UNDER 37 CFR 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.*

DO NOT SCAN

9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☐ is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. 1.16)

A. ☒ Regular application

CLAIMS AS FILED				
Number filed	Number Extra		Rate	Basic Fee 37 C.F.R. 1.16(a) $790.00
Total Claims (37 CFR 1.16(c)) 5 − 20 =	0	×	$ 22.00	--
Independent Claims (37 CFR 1.16(b)) 3 − 3 =	0	×	$ 82.00	--
Multiple dependent claim(s), if any (37 CFR 1.16(d))		+	$270.00	

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation $ 790.00

B. ☐ Design application ($330.00—37 CFR 1.16(f))

Filing Fee Calculation $_____

C. ☐ Plant application ($540.00—37 CFR 1.16(g))

Filing fee calculation $_____

11. Small Entity Statement(s)

☒ Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

(complete the following, if applicable)

☒ Status as a small entity was claimed in prior application 60 / 063,232, filed on October 23, 1997 from which benefit is being claimed for this application under:

35 U.S.C. ☒ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of **A, B** or **C** above)

$ 395.00

NOTE: Any excess of the full fee paid will be refunded if small entitiy status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 CFR 1.28(a).

12. Request for International-Type Search (37 C.F.R. 1.104(d))

(complete, if applicable)

☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.
(This and the surcharge required by 37 C.F.R. 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee	$ 395.00
☐ Recording assignment ($40.00; 37 C.F.R. 1.21(h)) (See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW APPLICATION".)	$ _____
☐ Petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached ($130.00; 37 C.F.R. 1.47 and 1.17(i))	$ _____
☐ For processing an application with a specification in a non-English language ($130.00; 37 C.F.R. 1.52(d) and 1.17(k))	$ _____
☐ Processing and retention fee ($130.00; 37 C.F.R. 1.53(d) and 1.21(l))	$ _____
☐ Fee for international-type search report ($40.00; 37 C.F.R. 1.21(e))	$ _____

NOTE: 37 CFR 1.21(l) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 CFR 1.53(f) and this, as well as the changes to 37 CFR 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(l) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed $ 395.00

14. Method of Payment of Fees

☒ Check in the amount of $ 395.00

☐ Charge Account No. _____ in the amount of $_____.

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: *If no fees are to be paid on filing, the following items should not be completed.*

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.*

☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 23-0442 :

- ☒ 37 C.F.R. 1.16(a), (f) or (g) (filing fees)
- ☐ 37 C.F.R. 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

- ☐ 37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
- ☐ 37 C.F.R. §§ 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a)).
- ☐ 37 C.F.R. 1.17 (application processing fees)

NOTE: ". . .A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

- ☐ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b).

NOTE: 37 CFR 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 CFR 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

NOTE: ". . . Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

☒ Credit Account No. 23-0442

☐ Refund

DO NOT ENTER

SIGNATURE OF PRACTITIONER

Reg. No. 31,391

Francis J. Maguire

Ware, Fressola, Van Der Sluys & Adolphson LLP

(type or print name of attorney)

Tel. No. (203) 261-1234

755 Main Street, P.O. Box 224

P.O. Address

Customer No. 004955

Monroe, Connecticut 06468

☒ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

☒ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added 5

☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

☐ This transmittal ends with this page.

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ADDED PAGES FOR APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED

NOTE: See 37 CFR 1.78.

17. Relate Back

WARNING: *If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.*

(complete the following, if applicable)

☐ Amend the specification by inserting, before the first line, the following sentence:

A. 35 U.S.C. 119(e)

NOTE: "Any nonprovisional application claiming the benefit of one or more prior filed copending provisional applications must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior provisional application, identifying it as a provisional application, and including the provisional application number (consisting of series code and serial number)." 37 C.F.R. § 1.78(a)(4).

☒ "This application claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S).:	FILING DATE
60 / 063,232	October 23, 1997 "
/	"
/	"

B. 35 U.S.C. 120, 121 and 365(c)

NOTE: "Except for a continued prosecution application filed under § 1.53(d), any nonprovisional application claiming the benefit of one or more prior filed copending nonprovisional applications or international applications designating the United States of America must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior application, identifying it by application number (consisting of the series code and serial number) or international application number and international filing date and indicating the relationship of the applications. . . . Cross-references to other related applications may be made when appropriate." (See § 1.14(a)). 37 C.F.R. § 1.78(a)(2).

☐ "This application is a

- ☐ continuation
- ☐ continuation-in-part
- ☐ divisional

of copending application(s)

☐ application number 0 /_____ filed on _____"

☐ International Application _____ filed on _____ and which designated the U.S."

NOTE: The proper reference to a prior filed PCT application that entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application that designated the U.S.

NOTE: (1) Where the application being transmitted adds subject matter to the International Application, then the filing can be as a continuation-in-part or (2) if it is desired to do so for other reasons then the filing can be as a continuation.

NOTE: The deadline for entering the national phase in the U.S. for an international application was clarified in the Notice of April 28, 1987 (1079 O.G. 32 to 46) as follows:

"The Patent and Trademark Office considers the International application to be pending until the 22nd month from the priority date if the United States has been designated and no Demand for International Preliminary Examination has been filed prior to the expiration of the 19th month from the priority date and until the 32nd month from the priority date if a Demand for International Preliminary Examination which elected the United States of America has been filed prior to the expiration of the 19th month from the priority date, provided that a copy of the international application has been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively. If a copy of the international application has not been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively, the international application becomes abandoned as to the United States 20 or 30 months from the priority date respectivley. These periods have been placed in the rules as paragraph (h) of § 1.494 and paragraph (i) of § 1.495. A continuing application under 35 U.S.C. 365(c) and 120 may be filed anytime during the pendency of the international application."

☐ "The nonprovisional application designated above, namely application _____ / _____, filed _____, claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S).:	FILING DATE
_____ /_____	_____"
_____ /_____	_____"
_____ /_____	_____"

☐ Where more than one reference is made above, please combine all references into one sentence.

18. Relate Back—35 U.S.C. 119 Priority Claim for Prior Application

The prior U.S. application(s), including any prior International Application designating the U.S., identified above in item 17B, in turn itself claim(s) foreign priority(ies) as follows:

Country	Appln. no.	Filed on

The certified copy(ies) has (have)

☐ been filed on _____, in prior application 0 /_____, which was filed on _____.

☐ is (are) attached.

WARNING: *The certified copy of the priority application that may have been communicated to the PTO by the International Bureau may* ***not*** *be relied on without any need to file a certified copy of the priority application* ***in the continuing application.*** *This is so because the certified copy of the priority application communicated by the International Bureau is placed in a folder and is not assigned a U.S. serial number unless the national stage is entered. Such folders are disposed of if the national stage is not entered. Therefore, such certified copies may not be available if needed later in the prosecution of a continuing application. An alternative would be to physically remove the priority documents from the folders and transfer them to the continuing application. The resources required to request transfer, retrieve the folders, make suitable record notations, transfer the certified copies, enter and make a record of such copies in the Continuing Application are substantial. Accordingly, the priority documents in folders of international applications that have not entered the national stage may not be relied on. Notice of April 28, 1987 (1079 O.G. 32 to 46).*

19. Maintenance of Copendency of Prior Application

NOTE: The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the continuation application. Notice of November 5, 1985 (1060 0.G. 27).

A. ☐ Extension of time in prior application

(This item ***must*** *be completed and the papers filed* ***in the prior application,*** *if the period set in the prior application has run.)*

☐ A petition, fee and response extends the term in the pending **prior** application until _____.

☐ A **copy** of the petition filed in prior application is attached.

B. ☐ Conditional Petition for Extension of Time in Prior Application

(complete this item, if previous item not applicable)

☐ A conditional petition for extension of time is being filed in the pending **prior** application.

☐ A **copy** of the conditional petition filed in the prior application is attached.

20. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

(complete applicable item (a), (b) and/or (c) below)

(a) ☐ This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are

- ☐ the same.
- ☐ less than those named in the prior application. It is requested that the following inventor(s) identified for the prior application be deleted:

_____

(type name(s) of inventor(s) to be deleted)

(b) ☐ This application discloses and claims additional disclosure by amendment and a new declaration or oath is being filed. With respect to the prior application, the inventor(s) in this application are

- ☐ the same.
- ☐ the following additional inventor(s) have been added:

_____

(type name(s) of inventor(s) to be added)

(c) The inventorship for all the claims in this application are

- ☐ the same.
- ☐ not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made
  - ☐ is submitted.
  - ☐ will be submitted.

21. Abandonment of Prior Application *(if applicable)*

☐ Please abandon the prior application at a time while the prior application is pending, or when the petition for extension of time or to revive in that application is granted, and when this application is granted a filing date, so as to make this application copending with said prior application.

NOTE: According to the Notice of May 13, 1983 (103, TMOG 6-7), the filing of a continuation or continuation-in-part application is a proper response with respect to a petition for extension of time or a petition to revive and should include the express abandonment of the prior application conditioned upon the granting of the petition and the granting of a filing date to the continuing application.

22. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

WARNING: "The claims of a new application may be finally rejected in the first Office action in those situations where (1) the new application is a continuing application of, or a substitute for, an earlier application, and (2) all the claims of the new application (a) are drawn to the same invention claimed in the earlier application, and (b) would have been properly finally rejected on the grounds of art of record in the next Office action if they had been entered in the earlier application." MPEP, § 706.07(b).

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary.

(check the next item, if applicable)

☐ There is provided herewith a Petition To Suspend Prosecution for the Time Necessary to File An Amendment (New Application Filed Concurrently)

23. Small Entity (37 CFR § 1.28(a))

☐ Applicant has established small entity status by the filing of a statement in parent application /_____ on _____ .

☐ A copy of the statement previously filed is included.

WARNING: See 37 CFR § 1.28(a).

24. NOTIFICATION IN PARENT APPLICATION OF THIS FILING

☐ A notification of the filing of this
(check one of the following)

☐ continuation

☐ continuation-in-part

☐ divisional

is being filed in the parent application, from which this application claims priority under 35 U.S.C. § 120.

Attorney's Docket No. 313-010-1 **PATENT**

Applicant or Patentee: Francis J. Maguire, Jr.

Serial or Patent No.: 0 /

Filed or Issued: Herewith

For: TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b))—INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN described in

- ☒ the specification filed herewith.
- ☐ application serial no. 0 / _____, filed _____.
- ☐ patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern, or organization
- ☐ persons, concerns or organizations listed below *

*NOTE: *Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).*

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Francis J. Maguire, Jr.

Name of inventor

Francis J Maguire Jr

Signature of Inventor

Date October 23, 1998

Name of inventor

Signature of Inventor

Date

Name of inventor

Signature of Inventor

Date

U.S. Patent Application of

FRANCIS J. MAGUIRE, JR.

C:\WP51\313\313-010.SPE

relating to a

TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN

Express Mail No. EL092375404US

TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to communication of images and, more particularly, to telepresence, including remote video monitoring.

2. Discussion of Related Art

Remote monitoring systems are known to include remotely located video cameras positioned for monitoring from a remote site with a personal computer or display. Such can be connected by any kind of connection such as point-to-point with a telephone line, via the internet or through an internet hub. A video server is used to capture successive real time images from a video camera, digitize and compress them and transfer them frame-by-frame through the internet, intranet or point-to-point protocol direct dial-in connection.

Telepresence is similar in concept to "virtual reality" except images and other stimuli are provided to the user via a connection in a telecommunications network. One approach uses a teleoperated camera platform coupled to the head movements of a remote user wearing a head-tracked, head-mounted display (HTHMD). See U.S. Patent No. 5,436,638 at column 1, lines 43-48 and column 3, lines 10-31. Instead of a HTHMD, a desktop display can be yoked to the movements of a user seated before the display such as shown in Figs. 13, 14A, 14B and 16 of U.S. Pat. No. 5,436,638. See also the PUSH desktop display and the BOOM3C head-coupled stereoscopic display, either hand-guided or hands-free (head-guided), of Fakespace, Inc., Menlo Park, California. Another approach is to use a remote reality engine with

prerecorded scenarios for selection over the network according to monitored movements of the user.

Due to the limited bandwidth typically available for such connections, the rate of frame delivery is very slow and therefore there is a noticeable lag between the time of image capture or retrieval and display. Moreover, the amount of video information conveyed is rather limited since the technology is based on the existing NTSC infrastructure. Consequently, the above described applications for telepresence tend to be lacking in the "presence" aspect and likewise remote viewing tends to be confined to rather static, e.g., industrial plant process monitoring, employee parking lot monitoring, security monitoring for plant ingress/egress, and the like.

However, various competing transport technologies are now being deployed to increase the bandwidth enormously and thereby speed up such connections. These include optical fiber networks, cable, satellite, and techniques to utilize the existing telephony infrastructure of twisted copper pairs as digital subscriber lines. Included in the services deliverable on the links provided according to such technologies will be HDTV. While the bandwidth of such links now being deployed to subscribers can be heavily proportioned in the downstream direction, they also provide at least a significant amount of upstream bandwidth. As a result, there will now be new opportunities for far more dynamic types of telepresence applications, including remote video monitoring, particularly on the Internet, and in ways heretofore never even contemplated. In particular, it can be foreseen that there will be extremely high demand for exciting, new telepresence applications.

Unfortunately, these telepresence applications suffer from an underlying assumption borrowed from the art of "virtual reality" where the user is enabled to

navigate within a virtual environment in a highly autonomous manner. The user takes command of the virtual environment and actively controls all of the responses of the reality engine according to monitored activity of the user. This dedication to a single user of the tools needed to generate the virtual environment makes the reality engine unavailable to all but this one user at a given time. A similar situation exists for a remotely located video camera. Since these tools are quite expensive, the cost of use for the single user is high. Hence the anticipated demand cannot be efficiently and economically met.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a new type of telepresence, including remote monitoring, that takes advantage of the increased bandwidth on links now being deployed.

Another object of the present invention is to provide telepresence to more than one user at a given time.

According to a first aspect of the present invention, a system for providing video images, comprises a video camera for providing video signals indicative of said video images captured by said video camera, a first display, responsive to said video signals, for providing said video images for viewing by a first user, an n-axis sensor, responsive to n-axis first display motions caused by said first user, for providing an n-axis attitude control signal, an n-axis platform having said video camera mounted thereon, responsive to said n-axis attitude command signal, for executing n-axis platform motions emulative of said n-axis first display motions, and one or more second displays, responsive to said video

signals, for providing said video images for viewing by one or more corresponding second users and responsive to said n-axis attitude command signal for executing n-axis second display motions emulative of said n-axis first display motions.

According to a second aspect of the present invention, a system comprises at least one reality engine for providing an image signal indicative of images taken from various attitudes, and a telepresence server, responsive to said image signal, for providing said image signal and an attitude control signal to at least one attitudinally actuatable display via a telecommunications network for attitudinally actuating said display for guiding a viewing attitude of a user and for displaying said images for said user of said at least one attitudinally actuatable display for passively viewing said images from said various attitudes. The telepresence server can be for providing access to said reality engine for an active user of a display attitudinally actuatable by said active user for providing said attitude control signal to said reality engine and to said telepresence server wherein the user is drawn from the general public with no special training. Or, the telepresence server can be for providing access to said reality engine for a trained director who can be local, not needing network access to the server, or remote, needing to access via a network.

According to a third aspect of the present invention, a display device comprises an n-axis display platform, responsive in a passive mode to an attitudinal control signal, for guiding a user's head to execute attitudinal movements, and responsive in an active mode to attitudinal movements of a user's head for providing sensed signals indicative of said attitudinal movements, and a display connected to said n-axis display platform,

responsive to a video signal, for displaying images corresponding to said attitudinal movements.

These and other objects, features and advantages of the present invention will become more apparent in light of the following detailed description of a best mode embodiment thereof, as illustrated in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows a prior art remote monitoring application;

Fig. 2 shows plural cameras mounted on corresponding n-axis platforms for being moved in an n-axis manner to monitor remote sites under the control of corresponding plural remote viewers each using a display such as a head mounted display having its attitude and/or position monitored in a corresponding n-axis manner;

Fig. 3 illustrates that one or more of the remote viewers may be passive viewers whose attitudinal head movements are not monitored at all but rather are guided to emulate the attitudinal head movements of an active viewer;

Fig. 4 shows one type of display for use by a passive viewer, according to the present invention;

Fig. 5 shows a telepresence server with a reality engine under the control of an active user, a local director, or a remote director and a plurality of passive users all interconnected by a communications network;

Fig. 6 shows a three-axis display that is usable in an active mode or a passive mode;

Fig. 7 shows a monitor screen where a user can choose a reality engine located at a remote tourist site for remotely viewing the chosen site; and

Fig. 8 shows the three-axis display such as shown in Fig. 6 in schematic block diagram form connected to the communications network of Fig. 5 via a signal processor.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows a prior art internet remote video monitoring application where a user 10 of a personal computer (PC) 12 can access the internet 14 via a modem 18 and a local internet service provider (ISP) 18. Another service provider is connected via a router 22 and a hub 24 to a plurality of video servers 26, ..., 28 which are in turn connected to a plurality of video cameras 30, ..., 32. The cameras can be located in different parts of an industrial plant such as the factory 34 and the warehouse 36. In this way the user 10 can monitor various parts of the plant remotely. It is even possible to remotely control the cameras, e.g., by controlling their lenses 38, 40 to zoom in and out. It should be realized, however, that the camera or cameras can be located anywhere and that the internet 14 can be any kind of connection or connections provided that bidirectionality is provided.

Given the typical bandwidth limitations of existing methods, such as methods for accessing the internet and other similar connections, this way of remote video monitoring has been found to be effective for rather static type applications such as security monitoring. E.g., a security officer sits before a PC or other display (or bank of displays) and monitors the desired points in various plants of a company from a single remote monitoring site. For this sort of application, a need for a large amount of bandwidth is not particularly important and hence the proven success of such relatively static applications. On the other hand, more dynamic

remote video monitoring applications, such as entertainment or education, cannot be expected to be viable using such limited bandwidth connections.

Telepresence concepts are shown implemented in Fig. 2 in a wideband network. A wideband internet service provider (WISP) 42 is shown connected to a plurality of displays for users at different geographical locations. The WISP 42 may be owned by a local telephone or cable TV company, for example, and can provide broadband services on any of the competing media illustrated such as a copper pair 44, a coaxial cable 46, an optical fiber 48, or equivalents such as wireless including satellite communications. Each of these will deploy their own peculiar subscriber interfaces 50, 52, 54, respectively. For instance, the twisted copper pair may be used as an Asymmetric Digital Subscriber Line (ADSL) using, e.g., Discrete MultiTone (DMT), Carrierless Amplitude Phase (CAP) modulation, or the like, and terminate with an interface 50 comprising an ADSL modem. Of course, other types of so-called xDSL technologies can be used as well. These include but are not limited to IDSL (ISDN DSL), HDSL (High-bit-rate DSL), SDSL (Symmetric DSL), RADSL (Rate-Adaptive DSL), and VDSL (Very-high-rate DSL). On the other hand, the cable interface 52 might simply be a part of a set top converter, for example, also used for conventional television as modified for web access, e.g., by the WebTV Networks unit of Microsoft, or by other providers such as Oracle Corp., Sun Microsystems Inc., Netscape Communications, General Instrument, Thomson SA, WorldGate Communications Inc., or the like. The fiber interface 54 might be an optical network unit (ONU) that converts downstream optical signals to electrical and formats them for a copper or cable connection to the subscriber and the reverse for upstream signals. The fiber 48 could also terminate in the user's premises. It

should be mentioned that other delivery systems are possible as well, including LMDS. Similarly, the internet is presently being augmented to service increased bandwidth requirements.

Considering the enormously increased bandwidth provided by the WISP 42, e.g., 7 or 8 Mbit/sec compared to 33 kbit/sec for the modem 16 of Fig. 1, it is now possible to provide new and more dynamic functions for remote video monitoring. For instance, Fig. 2 shows Head Mounted Displays (HMDs) 56, 58, 60 for use by three different subscribers connected to the respective interfaces 50, 52, 54 by signal lines 62, 64, 66 which can be bidirectional. Bidirectionality may be employed for conveying broadband video information downstream and command data upstream in a narrowband. The command data may be entered through a PC (not shown) or by means of input devices on the HMD itself, for example. It should be realized that the example of Fig. 2 does not exclude the coexistence of the possible transmission of wideband information, such as video, from the subscriber to the network as well, such as by using SDSL, mentioned above, or by making ADSL behave symmetrically although with a reduced downstream rate.

Various head mounted displays are known. One type is a see-through display where the real world view of the user is "augmented" with imagery from an image source, called "augmented reality". Another type completely blocks light from the outside and is for use in a completely virtual environment. Yet another type is a "video see-through" where the user wears stereo cameras on his head which provide images for perception of the surroundings using a head mounted display. All of these types of HMDs can be used to implement the present invention. However, many of these displays use bulky optics and related heavy cables which are somewhat

burdensome. Moreover, presently available optics have a rather narrow field of view and present video image resolution is rather poor.

A particularly attractive recent innovation for the purposes of the present invention is the retinal display which does away with the external display and the associated optics entirely. There is no comparable problem with narrow field of view and low resolution with a retinal display. A retinal display has been disclosed for providing a scanning light signal for the formation of images firstly and directly in the eye of a viewer: U.S. Patent No. 5,467,104 shows the projection of a modulated scanning light signal directly onto the retina of the viewer's eye without the prior formation of any real or aerial image outside the viewer's eye. In other words, light rays do not converge in any way outside the eye to form an image. That patent shows modulated photons of the light signal reflected from one or more scanners by way of projection optics directly onto the retina. A micromechanical scanner can be used as the scanning device, as shown in U.S. Patent No. 5,557,444 (based on U.S. Patent Application Serial No. 08/329,508, filed October 26, 1994). An optical fiber may be used to provide the light signal from the photon source to the scanner as shown in U.S. Patent No. 5,596,339 in order to promote a lightweight, head mounted, panoramic display.

In addition to the HMDs 56, 58, 60, a respective plurality of attitude sensors 62, 64, 66 are shown for mounting on the head of the user for sensing the rotational movements of the user's head and providing a sensed signal on a line 68, 70, 72, respectively, to interfaces 50, 52, 54 for upstream transmission. Such a device for determining orientation of a user's head using accelerometers is shown in U.S. Patent No. 5,615,132 to Horton et al. Another is shown in U.S. Patent No.

5,645,077 to Foxlin. Yet another is provided by Precision Navigation, Inc., 1235 Pear Avenue, Suite 111, Mountain View, CA 94043. For a simple case, it is assumed that translatory position (translation) of the user's head is not measured or, if measured, is ignored. A further simplification reduces the number of rotational degrees of freedom that are measured from three to two (e.g., pan (yaw) and tilt (pitch) as described below), or even just one. This simplification does exclude the measurement of translations, however.

The WISP 42 is connected by a signal on a line 74 and via the internet 76 and a signal on a line 78 to another WISP 80 connected in turn to a plurality of video servers 82, 84, 86 by signals on lines 87, 88, 89. It should be realized that there need not be two separate WISPs 42, 80, but that in certain circumstances one can suffice. The video servers are connected to a corresponding plurality of cameras 90, 91, 92 by a plurality of signal lines 94, 96, 98. The cameras 90, 91, 92 send video signals via the internet 76 to the HMDs 56, 58, 60, respectively, for display.

In the opposite direction, the interfaces 50, 52, 54 transmit attitude command signals in response to the corresponding sensed attitude signals on the lines 68, 70, 72 from the attitude sensors 62, 64, 66 through the WISP 42, the internet 76, the WISP 80 and the plurality of video servers 82, 84, 86 to a corresponding plurality of n-axis platforms such as three axis platforms 100, 102, 104.

The platforms 100, 102, 104 need not be three-axis, i.e., including pitch, roll and yaw but may be restricted to only two axes (e.g., pitch and yaw) or even just one (e.g., yaw). For instance, if roll is omitted, a 2-axis platform in the form of a computer controlled pan-tilt (2-axis:yaw-pitch) unit, Model PTU-46-70 or PTU-46-17.5,

produced by Directed Perception, Inc., 1485 Rollins Road, Burlingame, CA 94010 may be used. Actuators from other manufacturers such as Densitron may be used as well. In addition to one or more of the three attitudinal degrees of freedom, one or more of the three translational degrees of freedom may also be added in any desired combination. For example, a six degree of freedom platform could be provided.

While some of the attitudinal or positional degrees of freedom discussed above may be added or subtracted in a given application in different combinations, it should be realized that other degrees of freedom that are different in kind from those discussed above may also be added to an n-axis platform. For instance, the attitude sensor 62, as shown in Fig.3, can be for sensing 2-axes only, e.g., yaw (pan) and pitch (tilt) while an additional eye attitude sensor 106, as shown in Fig. 3 can be added for monitoring two degrees of freedom of the HMD 56 user's eyes. The eye sensor 106 provides a sensed signal on a line 108 to the interface 50. In that case, a four-degree of freedom, i.e., 4-axis platform 100 would be appropriate. Two axes for emulating the pitch and yaw of the user's head and two axes for emulating the pitch and yaw of at least one of the user's eyes. A 4-axis platform ("The vision-head") for carrying out the above is shown by the ESCHeR high performance stereo-head at the following internet site provided by Rougeaux Sebastian:http://www.etl.go.jp/etl/robotics/Projec...6/node4.html#SECTION00021000000000000000. See also http://www.etl.go.jp/etl/robotics/Projects/CogRobo/escher.html. Other camera motion platforms are available, for instance from HelpMate Robotics Inc., Shelter Rock Lane, Danbury, CT 06810-8159 under the product names BiSight/UniSight and Zebra at http://www.ntplx.net/~helpmate/. Another 4-Axis Stereo-Vision Head (TO 40)

can be obtained from Robosoft, Technopole d=Izarbel F-64210 Bidart, France at http://www.robosoft.fr.

Thus various combinations of monitoring of degrees-of-freedom of body parts can be used. Not only selected head and/or eye attitudinal degrees-of-freedom but also translatory (positional) degrees-of-freedom of the head can be monitored in one or more axes. These are altogether then emulated on the n-axis platform. Depending on the number of body parts and spatial motions thereof monitored, any correspondingly appropriate multi-axis positioning platform can be used. A platform based on those used for conventional flight-simulators but scaled down for a camera-sized application can be used. For instance, an even more scaled down version of the six degree of freedom principle demonstrated by the Polytec PI "Hexapod" can be used (Polytec PI, Inc., Suite 212, 23 Midstate Drive, Auburn, MA 01501 USA, the subsidiary of Physik Instrumente (PI) GmbH & Co., and Polytec GmbH, both of Polytec-Platz 5-7, 76337 Waldbronn, Germany).

It will now be more fully realized from the foregoing, as mentioned above, that there will now be new opportunities for far more dynamic types of telepresence applications, including remote video monitoring, particularly on the Internet, and in ways heretofore never even contemplated. In particular, it can be foreseen that there will be extremely high demand for exciting, new telepresence applications.

As also mentioned above, these telepresence applications suffer from an underlying assumption borrowed from the art of "virtual reality" where the user is enabled to navigate within a virtual environment in a highly autonomous manner. The user takes command of the virtual environment and actively controls all of the responses of the reality engine according to monitored activity of the user. This has been shown extended to a

wideband network in Fig. 2. This dedication of the tools needed to generate the remote presence for a single user is quite expensive. A way to meet the anticipated high demand in an efficient and economical manner will now be shown.

According to the present invention, the remote monitoring carried out under the control of a remote active viewer using an HMD/attitude sensor 56, 62 combination, such as in Fig. 2, can be used to control not only a camera/n-axis platform 88, 100, but also one or more passive viewing platforms for use by one or more remote passive viewers. In other words, both "what" the passive viewers see, and the "attitude" in which they see same, are controlled by the active viewer. Further, for such embodiments, according to the teachings hereof, the passive viewing need not be contemporaneous with the image acquisition process, but may be delayed in time to any desired extent using a memory or other storage facility.

For instance, Fig. 3 shows that one or more of the remote viewers may be passive viewers whose attitudinal head movements are not monitored at all but rather are instead guided to emulate the attitudinal head movements of the active viewer whose head movements are monitored by the attitude sensor 62 such as already shown along with the HMD 56 in Fig. 2, which is also shown again in Fig. 3. Such a passive apparatus 114 is shown in Fig. 3 with a light source 115, e.g., such as the type of display used for an HMD 116 (shown in Fig. 4), mounted on a head guide 118 which may be an actuatable multi-axis platform which is in turn actuated by an actuator 120 under the control of an actuation signal on a line 112. Several examples of such display devices for such passive use is described in more detail in copending application 08/794,122 filed February 3, 1997 and which is hereby

incorporated by reference. The actuation signal on the line 112 is provided by an interface 122 that receives a signal on a line 124 from the WISP 42. An image signal is also provided on a line 126 from the interface 122 to the light source 115.

As shown in further detail in Fig. 4, if the light source 115 is part of an HMD 116, the HMD may be optionally detachable along with the light source 115 from the headguide 118 and, for that purpose, will also optionally include an attitude sensor 62b so that the HMD and light source while detached from the head guide may alternatively be used in an active way by the viewer as previously described in connection with Fig. 3. It should be realized that there need not be any HMD provided with the passive apparatus 114 and that the light source alone can be used with the head guide with or without the attitude sensor. If used with a sensor, the apparatus 114 could be built in the same way as the various devices shown in U.S. Patent 5,436,638 except with actuators as well as sensors. For instance, the pivot 110 of Fig. 1 or the assembly 770 of Fig. 6 of Bolas et al could be actuated. It should also be realized, however, that such a light-source/head-guide combination can also be designed as a dual use active/passive display apparatus so the user can select to operate in either active or passive mode. The user will want to select active mode if the desired camera is not in use by anyone else. Or, if the desired camera is already in use, the user can select passive mode and the WISP 42 can then transmit the head attitude signals on the line 68 to both the n-axis camera platform 100 and to the apparatus 114 for actuating both the n-axis platform 100 and the apparatus 114 for emulating the attitudinal head motions of the user of the HMD 56.

Considering the foregoing, the systems of Figs. 2-4 can be used in a communication network application such as, but not limited to, the internet. A user of one of the HMDs 56, 58, 60 can contact his internet service provider 42 using an internet browser and access the internet service provider 80 for gaining control of one of the cameras 90, 91, 92 for the purpose of remote viewing. These cameras can be located in different locations such as the factory, warehouse and loading dock of the prior art mentioned above in connection with Fig. 1. However, given the wide bandwidth capabilities now becoming available, the cameras could be located in places that would have wide appeal to the general public such as tourist sites, educational settings, entertainment performances, or the like.

A conventional display 128 responsive to a signal on a line 130 from an interface 132 can be used instead of the HMD 56 or the device such as shown in U.S. Patent No. 5,436,638. An attitude sensor or a conventional input device such as a mouse, joystick or the like 134 can be used, or a sensor such as shown in U.S. Patent No. 5,436,638, to provide an upstream control signal on a line 136 to the interface 132. The interface 132 interchanges a bidirectional signal on a media line with a wideband internet service provider 140 connected to the internet 76 by a line 142.

The wideband internet service provider 80 could own and operate the remotely located cameras and provide internet access to the various active viewers of Fig. 2 through a web page of the provider 80. Or the provider 80 could allow other owners of such cameras or other reality engines to hookup and provide video services to the various active and/or passive users through his web page. Such a wideband internet service provider could become a provider of specialized video services such as

remote tourism. A problem with such a remote tourist site is that the demand for active control of a given camera, such as located at Niagara Falls, could become very high. In that case, the web page of the WISP 80 can give the user intending to use a particular site a choice: active or passive. If the camera at the desired site is not presently in use, then the intending user can choose the active option with his input device and take control of the remote camera by means of one of the attitude sensors 62, 64, 66 or the control device 134 of Fig. 2. But if the camera at the desired site is presently in use, the apparatus 114 of Figs. 3 or 4 becomes very useful because the user can opt to be a passive viewer. In that case, the control signal provided for instance by the active user of the HMD 56 to the n-axis camera platform 100 also has another role, i.e., to control the n-axis actuator 120. The actuator 120, in response to the signal on the line 112, causes the head guide to execute n-axis motions in emulation of the n-axis motions of the n-axis platform 100 executed in response to the signal on the line 94. Both the control signals on the lines 112 and 94 are derived from the sensed signal on the line 68 from the head attitude sensor 62. In the case of the remote camera, it is caused to execute attitudinal motions emulative of the commands of the remote user from the head attitude sensor 62. In the case of the apparatus 114, it is also caused to execute attitudinal motions emulative of the commands of the remote user from the head attitude sensor 62. Moreover, the video signals provided by the camera 90 via the internet 76 are provided to both the HMD 56 for viewing by the active viewer and to the light source 115 of the apparatus 114 for viewing by the passive viewer. It should be realized that although the attitudinal command signals for controlling the actuator 120 have

been described as coming from the sensor 62, they could be sent first to the video server 82 for repackaging and sent to the apparatus 114 along with the video signals by the server 82.

Fig. 5 shows a communications network 144 connected to a telepresence server 146 with a web server connected to a plurality of generalized reality engines 148, 149a, 149b. The reality engine 148, e.g., can be one or more "live" cameras on n-axis platforms or prerecorded "virtual reality" programs. A display 150 under the control of an active user is shown in Fig. 5, as described above. The active user can access a webpage of the telepresence server 146 and, if not being used, seize control of the reality engine as described above with the display 150. Subsequent users who can each be at different geographic locations and who want to use the reality engine cannot be active users but can be passive users using displays 152, 154, 156, ..., 158. As an alternative to the display 150 under the control of an active user drawn from the general public, the operator of the telepresence server 146 can use the services of a professional local director using a display 160 actively or a professional remote director using a display 162 actively who accesses the server through the network.

It should be realized that the displays need not be the versatile active/passive displays described here. The displays 150, 160, 162 can be designed to be useable purely as active displays such as the display shown in U.S. Patent No. 5,436,638 to Bolas et al. Likewise, the displays 152, 154, 156, ..., 158 can be designed to be useable purely as passive displays such as the various displays shown in co-pending U.S. Patent application serial number 08/794,122 filed February 3, 1997 or even the simple conventional monitor 128 of Fig. 2. However,

selectable active/passive displays are preferred for the reasons explained above.

It should also be realized that the selectable mode (active/passive) display does not have to include a detachable helmet mounted display for use when the active mode is selected. For instance, Fig. 6 shows a selectable mode (active/passive) device 163 wherein a display 164 is attached to a shaft 166 that is rotatable 168 about a vertical z-axis 170 in both modes. The user places his hands on hand grips 172, 174 and places his eyes on display viewports 176, 178. The shaft 166 is rotatably mounted in a disc 180 and is driven in the passive mode by a yaw motor 182 that is fixed to the disc 180. In the active mode, rotations about the z-axis are measured by a yaw sensor 184. The disc 180 is rotatably mounted within an inner annulus 185 on a pair of pins 186, 188 in the inner annulus for rotating the about an x-axis 190. One end of the pin 186 is fixed in the disc 180 while the other end is journaled in a bearing for being rotatably driven by pitch motor 192 fixed to or in the inner annulus. The pitch motor 192 drives one of the pins 186 as a drive shaft about the x-axis to pitch disc 180 and the display 164 forward or backward in the passive mode. A pitch sensor 194 mounted in or on the inner annulus 185 senses rotation of the disc 180 about the x-axis in the active mode while the pitch motor is inactive. One pin 196 is shown of a pair of pins fixed in the inner annulus but journaled on bearings in an outer annulus 198 for rotating the inner annulus about a y-axis 200. A roll motor 202 is fixed on or in the outer annulus 198 and drives the pin 196 as a drive shaft to rotate the inner annulus about the y-axis in the passive mode. A roll sensor 204 is fixed in or on the outer annulus and senses rotation of the inner annulus about the y-axis in the active mode while the roll motor is

inactive. It should be realized that the sensors can be used in the passive mode as well to provide feedback signals for controlling the motors in closed loop fashion. If not used in this way, the attitude of the display in passive mode can be controlled in open loop fashion.

Fig. 7 shows a screen 206 of a monitor 208 shown in Fig. 8 connected to a signal processor 210 by a line 212 that drives the monitor. A keyboard 214 is connected to the processor by a line 216. An intending user uses a mouse 218 connected by a line 220 to the processor to select, for example, one of the tourist sites shown in Fig. 7. The screen 206 shows nine available sites, most of which are inactive but two of which are "now active." One of the inactive sites such as the Grand Canyon can be selected with the mouse and the user is then able to use the display 164 of Figs. 6 and 8 in an active way. In that case, the motors 182, 192, 202 are inactive while the sensors 184, 194, 204 are used to indicate the present yaw, pitch, and roll, respectively, of the display 164 by providing a sensed yaw signal on a line 222, a sensed pitch signal on a line 224, and a sensed roll signal on a line 226. The signal processor 210, in response to the sensed signals on the lines 222, 224, 226, provides an output signal on a line 228 to a modem 230 which in turn provides the sensed signals on a line 232 to the communications network 144 and on to the reality engine 148 of Fig. 5 via the telepresence server 146. The server sends the sensed yaw, pitch, and roll signals to the reality engine such as a 3-axis camera platform such as the platform 100 of Fig. 3 located at the Grand Canyon. A camera on the platform such as the camera 90 provides an image signal on the line 94 back to the communications network 144 and on to the display 164 through the signal processor 210. In this way, the

device 163 of Fig. 8 is used like the display 150 used in active mode by an active user.

On the other hand, the user can instead use the mouse 218 to select one of the more popular sites that is already under active control indicated by "(now active)" such as Niagara Falls. In that case, the telepresence server 146 and reality engine 148 are responsive to the already active user's actions for causing images to be gathered from attitudes dictated by the active user and for providing the gathered images and the sensed yaw, pitch, and roll signals to the device 163 for use in a passive way. In other words, the communications network 144 provides the gathered images and sensed yaw, pitch, and roll signals from the device 150 used in an active way and provides them on the line 232 to the modem 230 which in turn provides them to the processor 210 for display on the display 164 and for controlling the yaw, pitch and roll motors by control signals on lines 234, 236, 238 for controlling the device 163 and hence the attitude of the display 164. In this way, a camera and associated platform at a popular site can be used by more than one user although only one is active. The same principle applies to accessing any kind of popular reality engine (such as preprogrammed "virtual reality" scenarios) which might otherwise be inaccessible because of high demand.

Although the invention has been shown and described with respect to a best mode embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions in the form and detail thereof may be made therein without departing from the spirit and scope of the invention.

Claims

1. System for providing video images, comprising:

a video camera for providing video signals indicative of said video images captured by said video camera;

a first display, responsive to said video signals, for providing said video images for viewing by a first user;

an n-axis sensor, responsive to n-axis first display motions caused by said first user, for providing an n-axis attitude control signal;

an n-axis platform having said video camera mounted thereon, responsive to said n-axis attitude command signal, for executing n-axis platform motions emulative of said n-axis first display motions; and

one or more second displays, responsive to said video signals, for providing said video images for viewing by one or more corresponding second users and responsive to said n-axis attitude command signal for executing n-axis second display motions emulative of said n-axis first display motions.

2. System, comprising:

at least one reality engine for providing an image signal indicative of images taken from various attitudes; and

a telepresence server, responsive to said image signal, for providing said image signal and an attitude control signal to at least one attitudinally actuatable display via a telecommunications network for attitudinally actuating said display for guiding a viewing attitude of a user and for displaying said images for said user of said at least one attitudinally

actuatable display for passively viewing said images from said various attitudes.

3. System of claim 2, wherein said telepresence server is for providing access to said reality engine for an active user of a display attitudinally actuatable by said active user for providing said attitude control signal to said reality engine and to said telepresence server.

4. System of claim 2, wherein said telepresence server is for providing access to said reality engine for a director.

5. Display device, comprising:

n-axis display platform, responsive in a passive mode to an attitudinal control signal, for guiding a user's head to execute attitudinal movements, and responsive in an active mode to attitudinal movements of a user's head for providing sensed signals indicative of said attitudinal movements; and

a display connected to said n-axis display platform, responsive to a video signal, for displaying images corresponding to said attitudinal movements.

ABSTRACT OF THE DISCLOSURE

A telepresence server is for connection to a telecommunications network for providing access to a reality engine for a plurality of passive users. The reality engine can be controlled by an active user or a professional director through the network or by a local professional director. Active/passive mode displays can be used by the passive users in a passive mode and an active/passive mode display can be used by the active user in an active mode.

Docket No. 313-010-1

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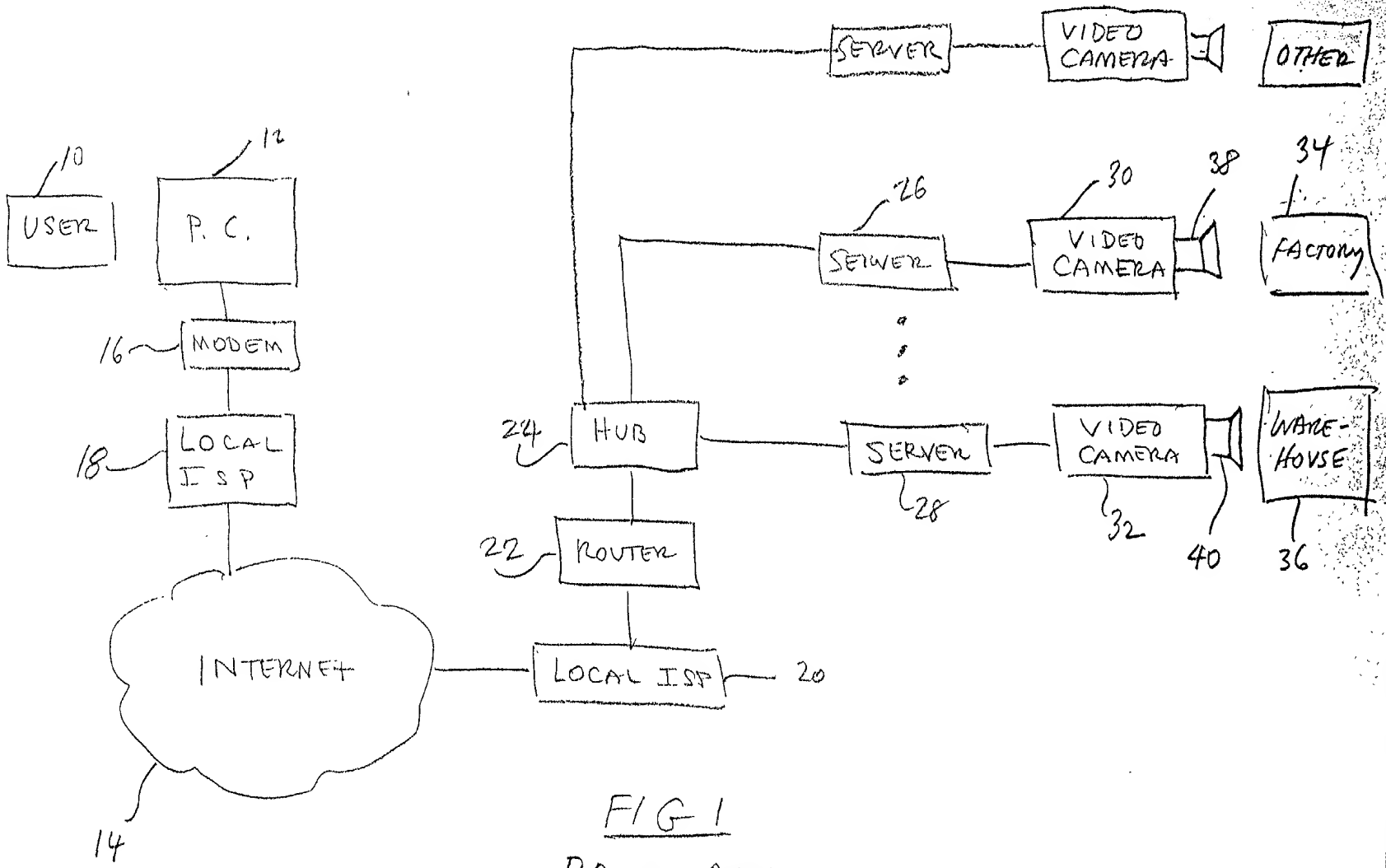
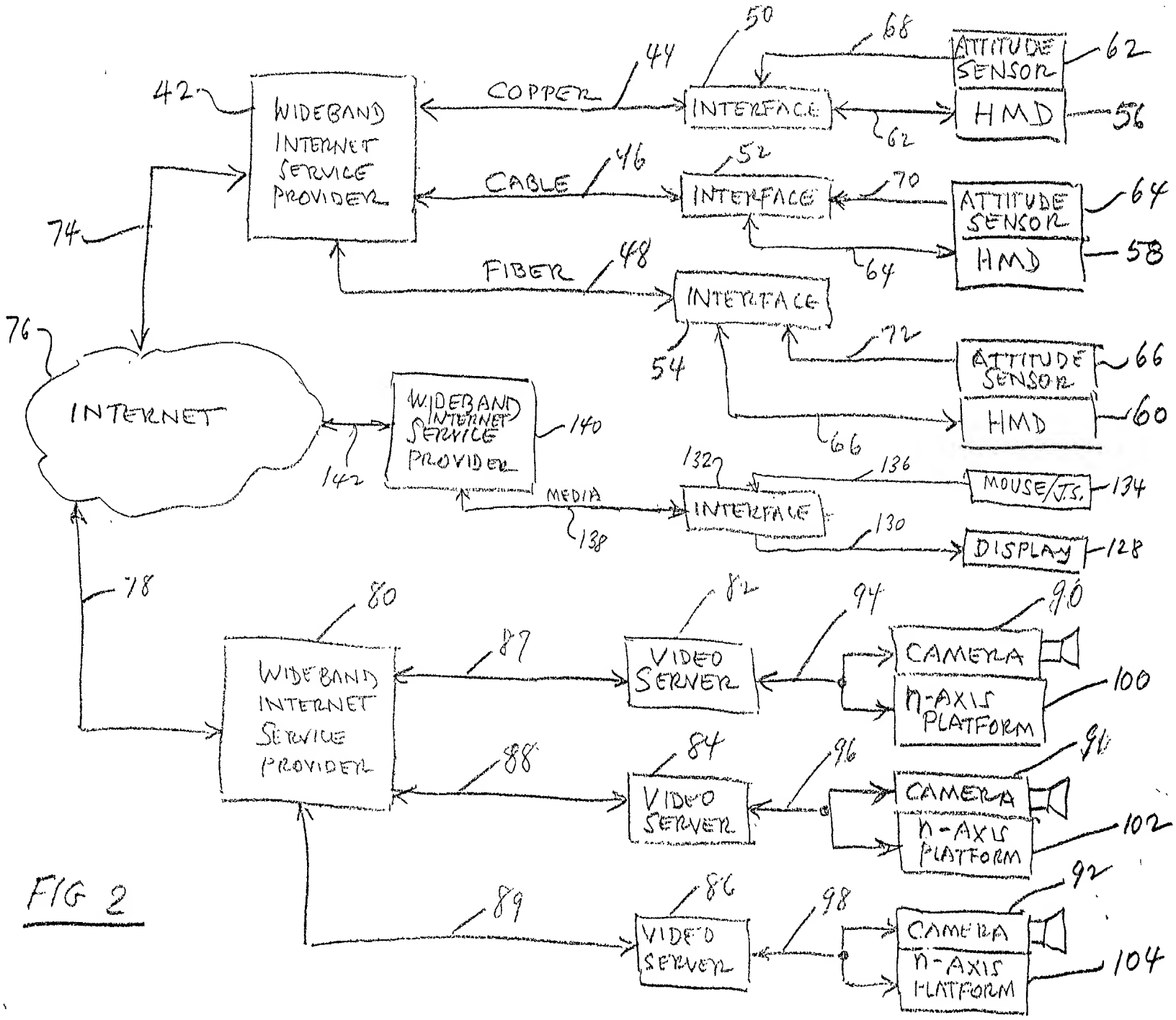


FIG 1

PRIOR ART


WIDEBAND INTERNET SERVICE PROVIDER
42
COPPER
44
CABLE
46
FIBER
48
INTERFACE
50
INTERFACE
52
INTERFACE
54
ATTITUDE SENSOR
62
HMD
56
ATTITUDE SENSOR
64
HMD
58
ATTITUDE SENSOR
66
HMD
60
68
70
72
74
INTERNET
76
WIDEBAND INTERNET SERVICE PROVIDER
140
142
MEDIA
138
INTERFACE
132
MOUSE/J.S.
134
136
DISPLAY
128
130
78
WIDEBAND INTERNET SERVICE PROVIDER
80
VIDEO SERVER
82
VIDEO SERVER
84
VIDEO SERVER
86
87
88
89
CAMERA
90
n-AXIS PLATFORM
100
CAMERA
91
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102
CAMERA
92
n-AXIS PLATFORM
104
94
96
98

FIG 2

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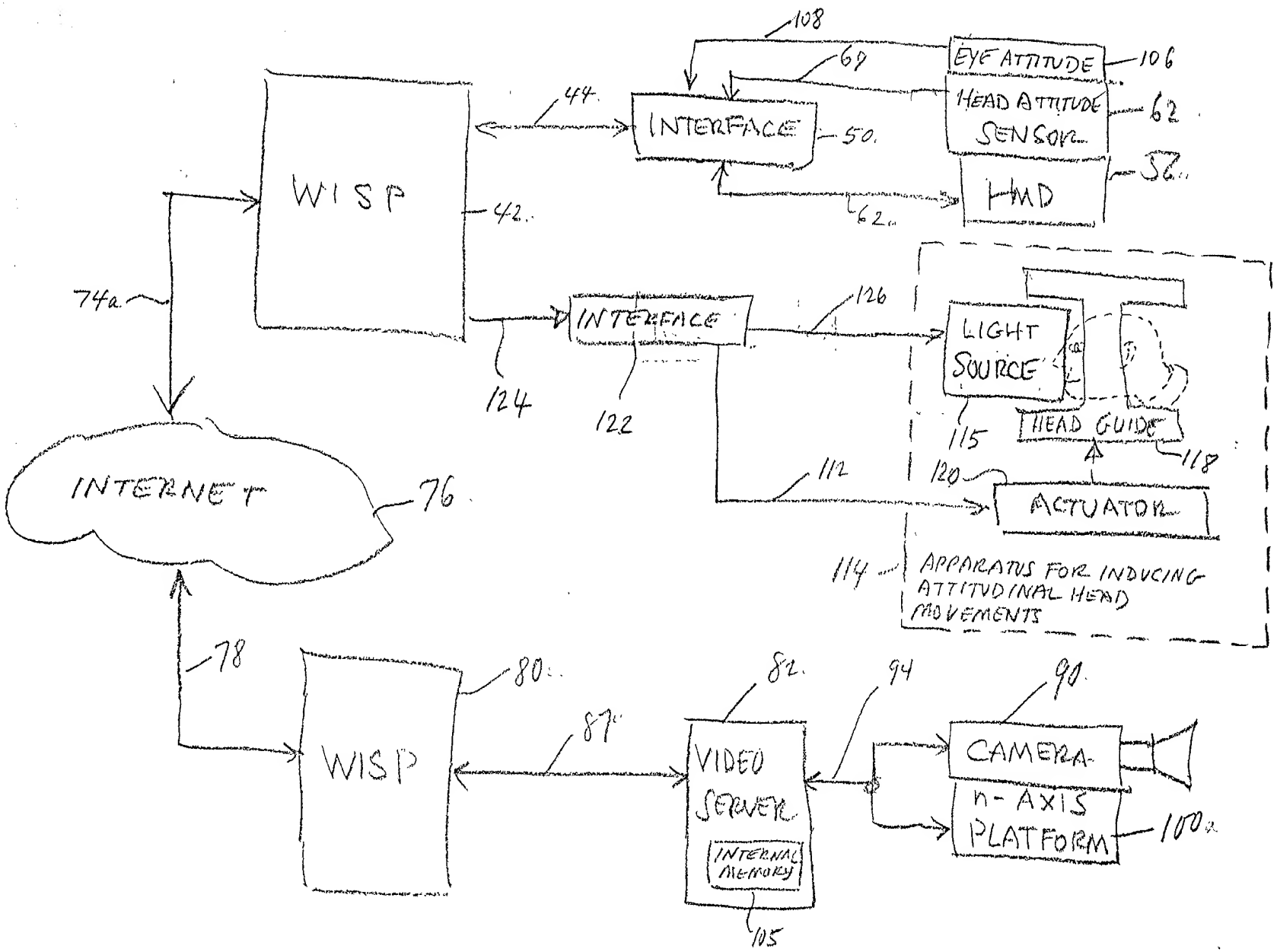


FIG 3

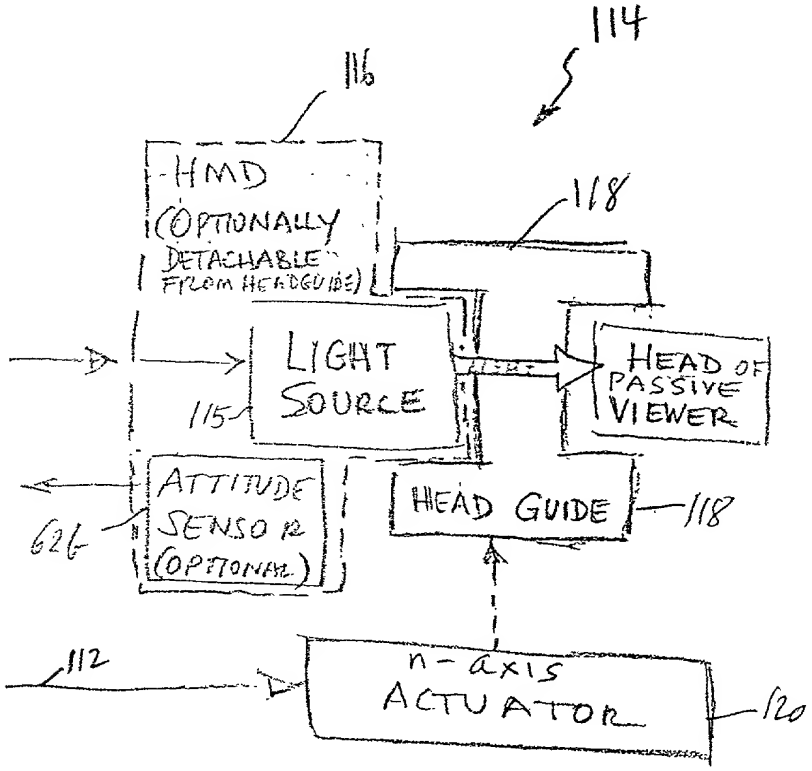

114
116
HMD
(OPTIONALLY DETACHABLE FROM HEADGUIDE)
118
LIGHT SOURCE
115
HEAD OF PASSIVE VIEWER
ATTITUDE SENSOR (OPTIONAL)
626
HEAD GUIDE
118
112
n-AXIS ACTUATOR
120

FIG 4

Sheet 5 of 16

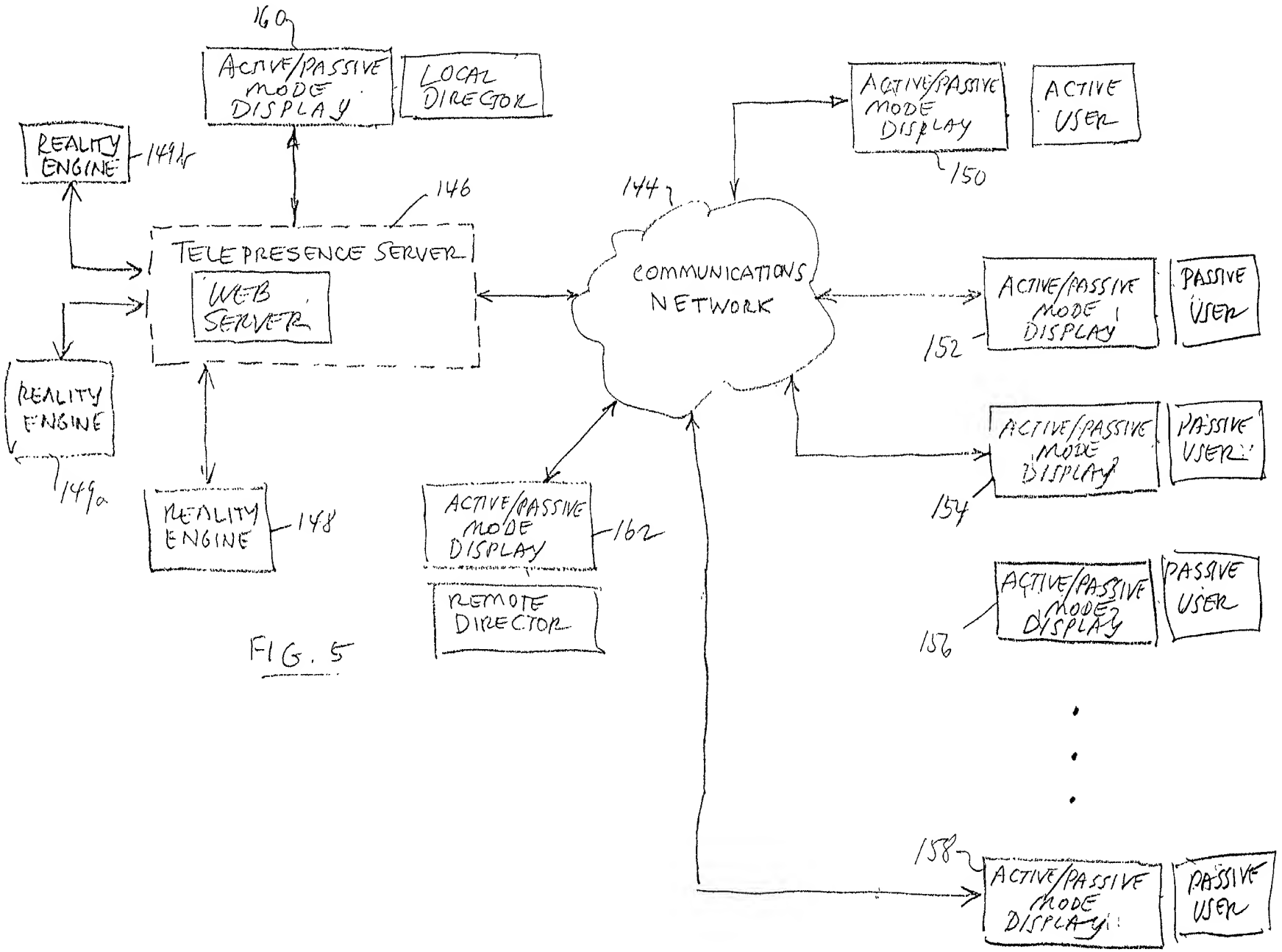
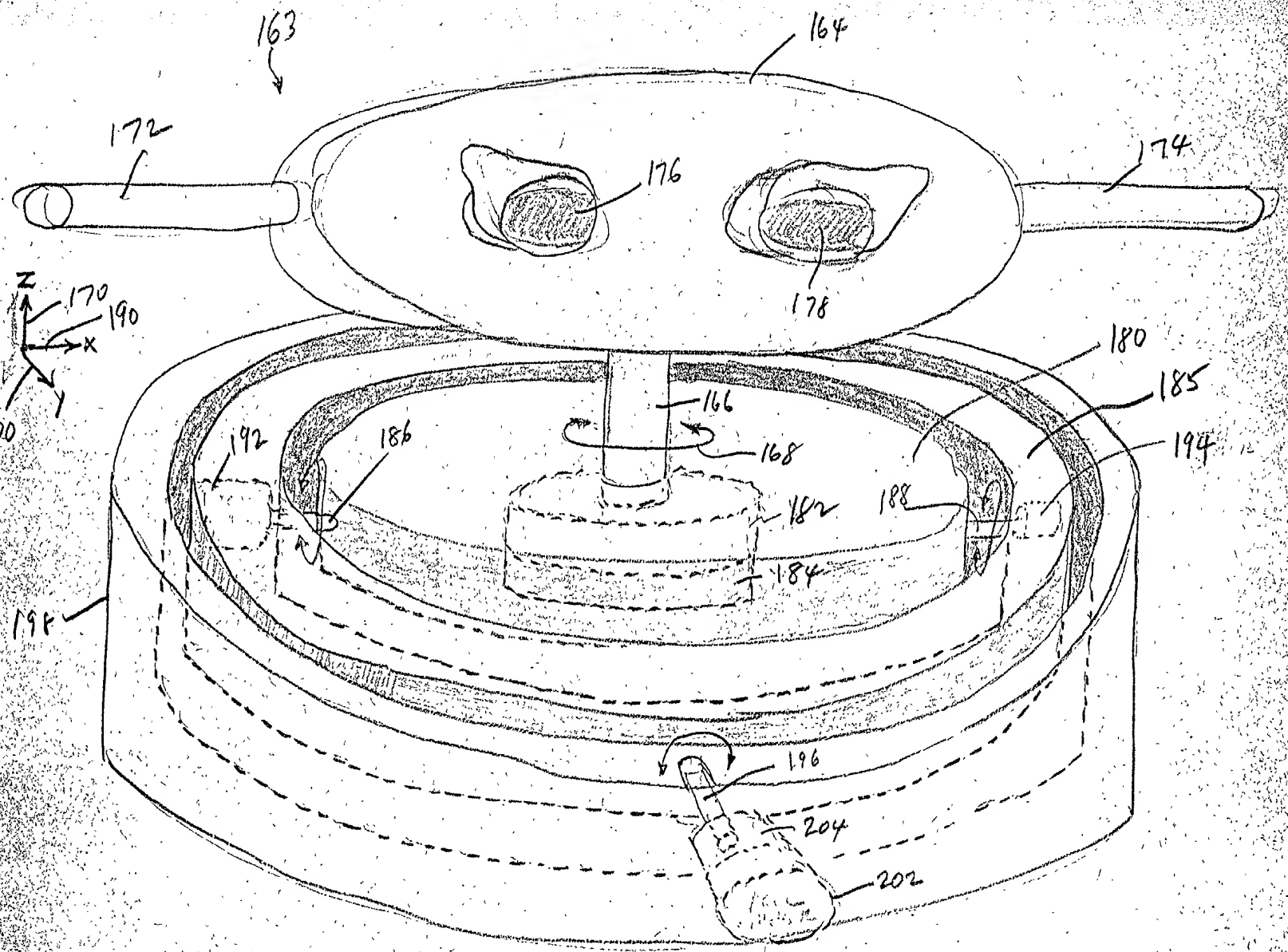


FIG. 5


163
164
172
174
176
178
170
190
200
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185
166
168
192
186
194
182
188
184
196
204
202

FIG 6

RECEIVED 96

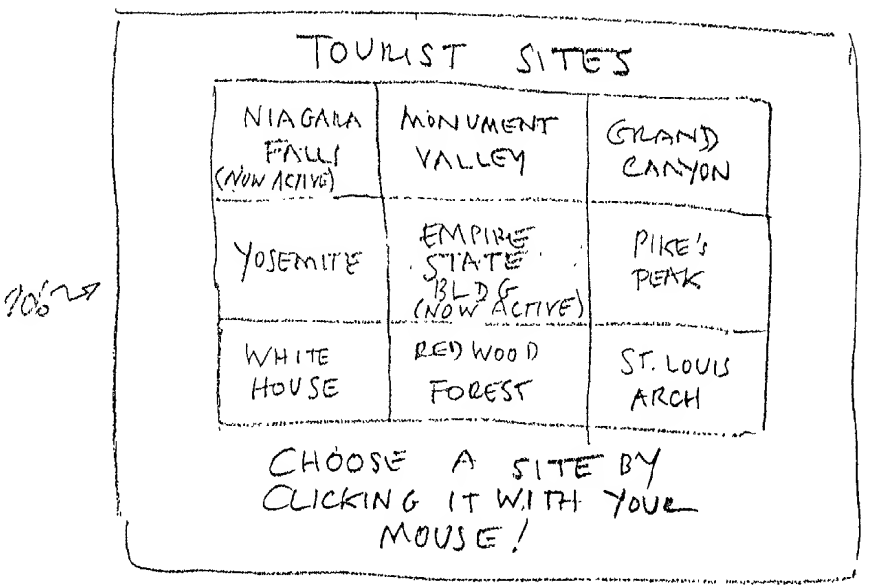

FIG 7

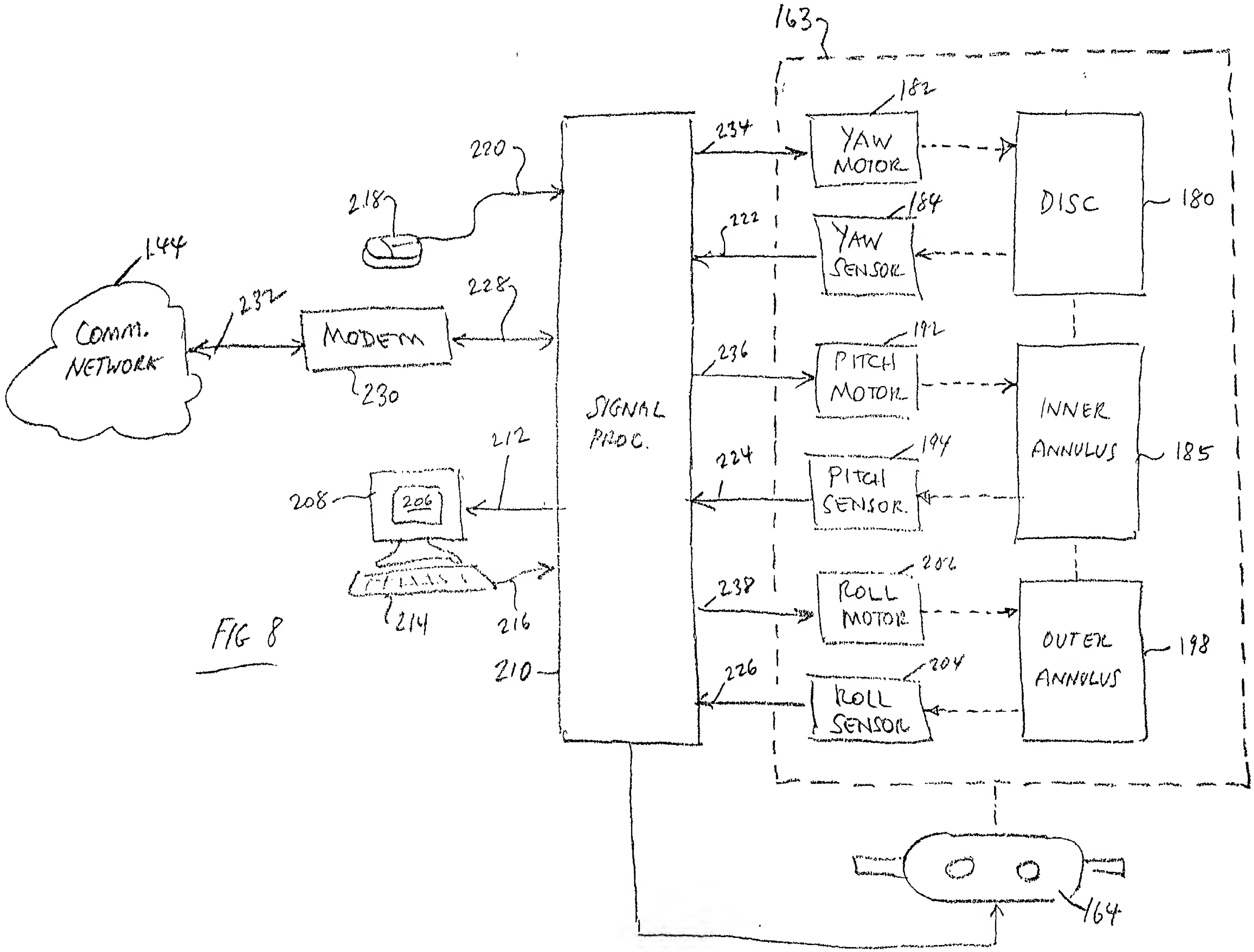
163
182
YAW MOTOR
184
YAW SENSOR
DISC
180
192
PITCH MOTOR
194
PITCH SENSOR
INNER ANNULUS
185
202
ROLL MOTOR
204
ROLL SENSOR
OUTER ANNULUS
198
164
SIGNAL PROC.
210
234
222
236
224
238
226
220
218
228
MODEM
230
232
COMM. NETWORK
144
212
206
208
214
216

FIG 8

COMBINED DECLARATION AND POWER OF ATTORNEY

313-010-1
(Docket Number)

As a below named inventor, I hereby declare that:

- my residence, post office address and citizenship are as stated below next to my name;
- I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **TELEPRESENCE SYSTEM AND ACTIVE/PASSIVE MODE DISPLAY FOR USE THEREIN**,
- the specification of which is attached hereto unless the following box is checked: ☐. If the box is checked,

  the application was filed on
  as U.S. Application Number
  or PCT International Application Number
  and was amended on (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application			Priority Not Claimed
(Application Number)	(Country)	(Day/Month/Year Filed)	☐
(Application Number)	(Country)	(Day/Month/Year Filed)	☐

To the extent permitted by rule or law, I hereby incorporate by reference the Prior Foreign Application(s) listed above.

I hereby claim the benefits under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

60/063,232 (Provisional Application Number)	**23 October 1997** (Day/Month/Year Filed)
(Provisional Application Number)	(Day/Month/Year Filed)

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose information which is material to patentability, as defined in 37 CFR §1.56, which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Number)	(Day/Month/Year Filed)	(Status--patented, pending, abandoned)
(Application Number)	(Day/Month/Year Filed)	(Status--patented, pending, abandoned)

I hereby appoint the attorney(s) and/or agent(s) assigned to the customer number listed below, as may from time to time be amended, belonging to the firm of **Ware, Fressola, Van Der Sluys & Adolphson LLP**, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Customer Number

4955 →

004955

PATENT AND TRADEMARK OFFICE

Address all telephone calls to: Ware, Fressola, Van Der Sluys & Adolphson LLP at (203) 261-1234. **Address all correspondence to:**

Customer Number

4955 →

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Francis J. Maguire, Jr. Full name of sole or first inventor (given name, middle initial, FAMILY NAME(S) IN UPPER CASE)	
Francis J Maguire Inventor's Signature	23 October 1998 Date
Southbury, Connecticut Residence	**U.S.A.** Citizenship
Post Office Address: **88 Greenwood Drive, Southbury, Connecticut 06488**	

Full name of second inventor (given name, middle initial, FAMILY NAME(S) IN UPPER CASE)	
Inventor's Signature	Date
Residence	Citizenship
Post Office Address:	

Full name of third inventor (given name, middle initial, FAMILY NAME(S) IN UPPER CASE)	
Inventor's Signature	Date
Residence	Citizenship
Post Office Address:	

☐ Additional inventors are being named on separately numbered sheets attached hereto.